

neither very high nor very low when compared with other kinds of foliage.*

It would be interesting to try this simple experiment on other epiphytes, not only ferns, but mosses and lichens and flowering plants too, in warm climates where aerial spermatophytes are available. Possibly few botanical laboratories are provided with the requisite incinerating apparatus, but in the case of those connected with colleges there is usually a chemical laboratory near by. If the services of a competent chemist could be enlisted the ash of many such plants might be analyzed, with results not only interesting from an ecological standpoint, but perhaps also of diagnostic value in distinguishing related species.

For accurate results certain precautions should be observed, such as collecting all the material from the same tree or same kind of tree, washing off any possible dirt and dust, testing it at different seasons of the year or taking old and young foliage separately, etc. It would be a simple matter also to determine at the same time the ash content (with analysis if possible) of the bark on which the plants grow.

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Another "Freak" Equisetum

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While collecting on the southwest slope of Mount Jefferson, in Linn County, Oregon, on Aug. 13, 1919, in company with Professor M. E. Peck, we found that the delta at the east end of Pamela Lake (altitude 4000 feet) was occupied by an almost pure growth of a tall *Equisetum* with freely-branching, rather weak

* For ash determinations of several types of herbaceous vegetation on Long Island see *Plant World* 21: 43-46, 1918.

stems, of the section *Euequisetum*, which was unfamiliar to both of us. This delta, formed by the entrance of a considerable mountain-stream from the melting snows in Hunt's Cove, occupied an area of perhaps five acres, making a vivid patch of dark green in the rather arid region surrounding it. The *Equisetums* averaged about 10 dm. in height, naked below, with 5 to 10 whorls of rather long flexuous branches above, and covered the ground as closely as wheat in a grain-field. The only associates that we observed were *Carex sitchensis*, *Calamagrostis canadensis* and *Cinna latifolia*, none of which were at all frequent.

An examination of the specimens that I brought home led me to the conclusion that the plant was *E. fluviatile* L.—a determination kindly confirmed by Professor L. S. Hopkins. This is a species of very wide range both in North America and Eurasia, although not to my knowledge previously collected in Oregon. The range for the Pacific Coast given by Piper in his *Flora of Washington* (p. 86. 1906) is "Alaska to Washington." Henry in his *Flora of Southern British Columbia* (p. 9. 1915) gives it as "Alaska to Oregon," but cites no specimens to confirm it. The herbarium of the University of Oregon contains no specimen from the Pacific slope. The fact that this is its first occurrence in five years of assiduous collecting shows that it is at least not frequent here.

Of the plants observed, not above one in fifty bore the fruiting cone, the apex of the others being wholly sterile. The "freak" specimen, to which our attention was specially directed, may be briefly described as follows:

Total height of stem, 8 dm., naked for 5.3 dm. above the base, then 7 whorls of branches and a normal strobile at the apex. The uppermost whorl was composed of 16 branches, the longest measuring 8.5 cm. Fifteen of these branches bore strobiles at the tip,



EQUISETUM FLUVIATILE, VAR. POLYSTACHYUM
Photograph by L. S. Hopkins of specimen collected by J. C. Nelson.

smaller than the normal one at the apex of the plant, the latter being 2 cm. long, while the largest of the 15 on the branches measures only 8 mm.

The next whorl below this was made up of 22 branches, the longest 9 cm. Sixteen of these also bore cones, the largest being about 1 cm. long. No cones were observed on any branches below those of the two upper whorls.

Mr. C. A. Weatherby, who has very kindly looked up the literature of this interesting form, informs me that it is known as *E. fluviatile* var. *polystachyum* (Brückn.) A. A. Eaton, Fern Bull. x. 74(1902), and that at the time when Eaton published the new combination but one specimen had been known to occur in the United States, collected by J. B. Flett at Tacoma, Wash. The form seems to be well-known in Europe, however, having been originally described by Brückner as *Equisetum polystachyum* in 1803 (Fl. Neobrand. Prod. 63), and has since his day acquired a synonymy quite too formidable to be reproduced here.

In one other specimen collected, the terminal cone, instead of being solitary, bore a smaller one on each side of it, giving a sort of fleur-de-lis effect to the apex of the stem, and seeming to indicate that the evolution of the species is still in a state of very unstable equilibrium.

The specimen with the fruiting branches has been deposited in the Herbarium of the Fern Society (my no. 2781 $\frac{1}{2}$), and the writer is indebted to the kindness of the Curator, Professor L. S. Hopkins, for the illustration here presented.

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